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Report of the Mycologist for the year ending
April 30, 1910. MAR 28 1910

BOARD OF AGRICULTURE,
Port-of-Spain, Trinidad.

GENTLEMEN,

I am herewith submitting a report briefly covering the work which has been done along mycological and pathological lines during the past year, and containing plans and suggestions for the work which I wish to carry out this year.

Although I assumed the duties of Mycologist on April 15, 1909, neither a suitable laboratory room nor fund for the purchase of necessary apparatus was provided until after Mr. Carruthers' arrival, so that I was much handicapped in my work during the first six months of service and was obliged to spend much time simply in making field observations on the prevalence and distribution of plant diseases and in becoming familiar with the methods of cultivating and harvesting the various crops grown on the Island. With the acquisition of the room at the Experimental Station and the purchase of some much needed apparatus a laboratory has been fitted up, which is now serving the purposes of the work fairly well, but if mycological and pathological work is to become a permanent fixture in the Department of Agriculture more room and equipment will be necessary.

DISEASES OF CACAO.

On taking up phytopathological work in the tropics for the first time one is almost appalled by the great number of interesting problems awaiting solution, and it is difficult to select those of most importance. However, after making preliminary visits to a number of cacao, coconut, and sugar estates in the various parts of the Island and noting the fungous diseases present on each, I decided that the diseases of cacao were responsible for the greatest losses, and I have devoted the greater part of my time to the study of some of these diseases.

An examination of the literature shows that much confusion exists as to the causes of a number of the common cacao diseases. An endeavour has been made to clear up some of the doubtful points. Cultural and inoculation experiments have proved that the two most serious diseases here, the canker of the tree and rot of the pods, are both caused by the same fungus, a species of *Phytophthora*. This fungus attacks not only small pods, causing them to blacken and shrivel, but larger ones as well producing the so-called "black cocoa." From the pods the fungus grows into the cushion and spreads in the surrounding bark killing the tissue and causing the disease commonly known as canker. Numerous inoculations of both pods and bark have been made with several species of *Nectria* and other fungi which have hitherto been regarded as the causes of canker and pod disease but the results have always been negative. A paper on the canker and pod rot caused by *Phytophthora* is in course of preparation. A number of minor diseases of cacao are also under

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investigation among which may be mentioned, die back, thread-blight root disease, anthracnose of pods and the chupon disease; these will be reported upon later.

Since the publication of Dr. Fredholm's translation of Dr. Van Hall's paper on the witch broom disease of Suriname a great many specimens of suspected witch broom have been sent to the office for examination but none of these have proved to be typical witch brooms such as destroy the trees in Suriname, and as was pointed out in the last number of the Bulletin there is no proof as yet that star blooms, indurated pods, "male" cacao and other abnormal growths which are commonly met with here are symptoms of the true witch broom disease.

CACAO SPRAYING EXPERIMENTS.

Spraying experiments for the control of the cacao pod rot were started last July, and are now being carried out on three different estates located at Tumpuna, Sangre Grande and Williamsville. The results from these experiments have been uniformly successful and show conclusively that spraying not only reduces the rot of mature or $\frac{3}{4}$ grown pods, the so-called "black cocoa," but increases the yield as well by protecting the very young pods from fungus attack.

In the experiment at Tumpuna the trees were sprayed twice last September, and to the present time from 500 sprayed trees 1,608 more pods have been picked than from 500 adjacent unsprayed trees. Twenty-nine per cent. of the cocoa from the unsprayed trees was black while only 7 per cent. of that from the sprayed trees was black, as a result of this 2,125 more sound pods have been picked from the sprayed trees.

At Sangre Grande the trees were sprayed once in December and again in February. In the last four pickings 1,725 more pods have been gathered from the sprayed than from the unsprayed trees.

A bulletin giving the results from all the experiments, the mixtures used, the methods of applying the solutions, and the cost of application will be issued later on in the year. It may be mentioned in passing however that spraying cacao, if done thoroughly and properly pays, for it not only gives an increase in yield which more than compensates for the outlay in labour and material, but also protects the trees from canker infection through diseased pods, and controls various minor diseases such as thread blight, chupon disease, etc., which are found on almost every estate. Spraying also makes hand mossaing unnecessary.

DISEASES OF SUGAR CANE.

During the rainy season of last year a number of sugar estates were visited and an examination of various fields was made in order to determine if there was any connection between the root disease and the blight. As was reported at the September meeting of the Board no relationship between the two diseases was found, and though they sometimes may be found together in the same field either may occur without the other.

A fungus named by Massee *Septocylindrium suspectum* from material sent to Kew from the Caroni estate by Mr. Kay was frequently found on dead adult froghoppers, but whether or not it is

parasitic has not yet been determined. I hope to make some tests with this fungus during the coming rainy season to determine this point.

DISEASES OF THE COCONUT PALM.

The coconut diseases of the Island were reported upon by Stockdale in the latter part of 1908, and under the Plant Protection Ordinance the bud-rot and root disease were proclaimed as dangerous diseases, but so far as I know no steps were ever taken to enforce the Ordinance in regard to them. Spraying is impracticable as a means of controlling coconut crown and stem diseases on account of the height of the tree, so that rather drastic measures have to be depended upon to hold such troubles in check. Of the crown diseases undoubtedly the bud-rot is the most serious, and every means should be taken to keep it under control. In order to prevent this disease from spreading every tree affected with it, even if only showing the first symptoms, should be cut down and destroyed.

In the southern part of the Island the root disease, first described by Stockdale, has been responsible for the death of a large number of trees. This disease is complicated by the fact that the bud of affected trees frequently rots; whether this rot should be considered bud-rot or simply the last symptom of the root disease can only be determined by a cultural study of the bacteria associated with it in order to ascertain if the organism which causes the true bud-rot is present. The fungus causing the root disease has not been definitely isolated nor is the way in which it spreads from tree to tree clearly understood, so that perhaps the best methods of treatment or of control cannot yet be given. But the facts that the bud of trees affected with this disease frequently is killed by a soft bacterial rot which may be the same as the bud-rot disease, and that Stockdale has suggested as a cause of the trouble a fungus which fruits on the leaves of diseased trees, make it essential, as a method of safeguarding healthy trees, to destroy the buds and leaves of affected trees. Perhaps later, when both bud-rot and root disease are better understood some other method of control may be worked out, but at the present time the destruction of infectious material is the best known means of combatting these diseases.

The work of destroying diseased coconut palms for which you voted the sum of \$500 in November last, has been pushed forward as quickly as was possible and to date about 8,000 dead or dying trees have been cut down with an expenditure of about \$375. Mr. Plummer has had charge of this work. I think he will have completed the tour of the whole Island by the end of June, and will then start on a second round, if an additional sum of money will be granted for this purpose.

Until some better means of control of coconut bud-rot and root disease be learned I think it essential for the preservation of the coconut industry here that the present ordinance be enforced, or perhaps better, a new ordinance be made dealing with these diseases alone. Under such an ordinance, an inspector should be appointed, and I would suggest Mr. Plummer for the post, whose duty it would be to see that the ordinance was enforced.

The bleeding stem disease of coconut palms is prevalent in some parts of the Island. A similar disease is reported from Ceylon, where Petch has proved it due to the fungus *Thielaviopsis ethacetica* Went. Petch's method of holding the disease in check by cutting out the diseased tissues and tarring the wound has been used here successfully on some estates.

A disease which may be called the little leaf disease is very common in some places. The leaves of the trees affected with this disease stand erect and never attain their normal length, but remain stunted and the leaflets are often crimped. The leaves become shorter and shorter as time goes on until finally the tree dies. Very occasionally a tree will outgrow this disease. Its cause is unknown. Petch has recently described a somewhat similar disease from Ceylon under the name of root disease.

The leaf disease of coconut palms though widespread here does not seem to be at all serious.

DISEASES OF BANANAS.

Three diseases of bananas and plantains are commonly met with in Trinidad. Perhaps the most important is the Gros Michel or Panama disease, the cause of which has not been definitely settled.

Dr. Erwin F. Smith of the U. S. Department of Agriculture in a paper read before the American Phytopathological Society at a meeting held in Boston last December, described a fungus belonging to the genus *Fusarium* which he isolated from diseased plants from Cuba. Inoculations with pure cultures of this fungus showed that it is evidently a parasite, but at the time of the meeting the inoculations had not been made long enough for the plants to show all the typical symptoms of the Panama disease.

McKenney who has studied the disease in Costa Rica and Panama also read a paper at the same meeting. He described the symptoms of the disease in detail but simply states that the cause "is in all probability a vegetable parasite."

Essed, working on this disease in Paramaribo has recently reported that it is caused by a fungus belonging to the "Ustilagineae probably in company with a member of the Chytridiales order," and states that his figures will help corroborate his preliminary conclusions. His theory is rather an unusual one, and his figures do not clearly show characters typical of either order of fungi which he mentions.

Last November I isolated a species of *Fusarium* from diseased Gros Michel plants from the St. Joseph district and more recently the same fungus from some diseased plants from Suriname. As yet the results of my inoculations on healthy plants with this fungus are doubtful.

Another disease, especially of plantains which is common here is the Moko disease. As I have proved by a number of inoculation experiments this is unquestionably a bacterial disease. I at first thought that this and the Panama disease might be one and the same, but if the latter is proved to be caused by a species of *Fusarium*, it is evident that the two diseases are distinct.